

PRELIMINARY REMARKS

The Applicant respectfully contends that one embodiment of the invention is limited to “a technique for coating a substrate with a liquid material in such a way that the liquid material forms a coating with acceptable thickness uniformity across the substrate while avoiding the use of rotary or other mechanical motion to create a rotational liquid material flow.” (**Description of the Preferred Embodiments** at page 4). Further, all art that has been cited has rotary or other mechanical motion, or does not create rotational liquid material flow by directing the liquid material angularly toward the substrate so that the liquid material flows rotationally upon contact with the substrate surface.

The Applicant respectfully continues to contend that the claims distinguish over the mechanically rotating structures of the prior art. For example, claim 1 requires

directing the liquid material angularly toward the substrate surface ***so that the liquid material flows rotationally*** upon contact with the substrate surface

(claim 1, emphasis added). What is taught and claimed is neither taught nor suggested by the prior art.

The Office Action continues to maintain that

(d) 0° from perpendicular can be an angularly application of the liquid material because Applicant has not provided a definition of angular application.

(Office Action at page 5). The Applicant considers this to be a disingenuous assertion. As evidence thereof, the Examiner proceeds to use the phrase “[Tomoeda et

al.] direct[s] the liquid material angularly toward the substrate” (Office Action at page 7) that refers to several figures that illustrate angular, *i.e.*, non-perpendicular flow that alone, would result in radial flow.

Further, the Applicant distinguishes between angular and perpendicular (see disclosure at page 2, line 12, **Background Section** “spraying a liquid of fluid directed perpendicularly toward the substrate surface.”) Because the Applicant has never asserted, disclosed, or claimed that angular is perpendicular, and because “angular perpendicular” would not allow

directing the liquid material angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface

(claim 1), the rejection should be withdrawn. Further, because the Applicant is allowed to be his own lexicographer, because the Applicant has distinguished between perpendicular and angular in his specification, and because “angularly nonperpendicular” would be a redundant phrase, withdrawal of the rejection is respectfully requested.

The Office Action also continues to assert that

(a) a rotational liquid flow is achieved in Mori by virtue of a rotating substrate . . . [and that] Applicant does not claim a non-rotating substrate so Mori meets the limitations of Claims 1, 18, and 34.

(Office Action at page 5). The Applicant notes that the claim language requires directing the liquid material angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface

(claim 1). Thus, it is the flow directing that causes the liquid material to flow rotationally upon contact with the substrate surface such that rotation of the substrate, a condition specifically identified as a problem in the prior art, is not needed. Withdrawal of the rejection is respectfully requested.

The Office Action continues to assert that

(b) the submitted art Transport Phenomena by Bird, Stewart, and Light foot pages 219-220 does not appear to apply in this case because there is no reference to the effects of the passage of liquid material through a rounded mesh anode and the subsequent impinging of liquid on a substrate.

(Office Action at page 5). The Applicant considers this to be a disingenuous assertion since identical flow regimes are depicted in Mori at Figures 1, 3, and 6, in spite of there being three different porous anodes that would materially alter flow patterns. Mori either does not understand or does not appreciate streamlined flow in a sudden enlargement. If Mori had been concerned with accurately depicting flow by streamlines, he would have been obliged to depict a different flow regime for each of Figures 1, 3, and 6. Rather, Mori ignorantly depicts identical flow regimes despite the presence of three materially different porous anodes that would alter flow patterns. As such, it can only be concluded that Mori neither taught nor appreciated what is claimed and that the authoritative teaching by Bird, Stewart, and Lightfoot is correct. Withdrawal of the rejection is respectfully requested.

The Office Action continues to assert that

(c) the mesh anode of Mori comprises a plurality of spray outlets as defined and explained in the last office action.

(Office Action at page 5). The Applicant notes that such an assertion can only arise after the examiner has used the Applicant's disclosure as a guide since Mori, as set forth above, depicts identical flow regimes between the respective anodes 5 (Figure 1), 105 (Figure 3) and 110 (Figure 6) and the substrates 7 (Figure 1), 107 (Figure 3), and 107 (Figure 6). Identical depicted flow regimes demonstrate Mori's lack of appreciation of any virtual spray nozzle effect. As such, Mori neither teaches nor suggests the spray nozzle limitations of the instant invention. Withdrawal of the rejection is respectfully requested.

REMARKS

Claims 1-5, 18-19, and 21-38 are pending.

Rejections under 35 U.S.C. §102(b)

Claims 1,3,4, and 18-20 were rejected under 35 U.S.C. §102(b) as being anticipated by Kobayashi (US 5,830,334). The Applicant respectfully traverses this rejection and requests the Office to consider the following.

Kobayashi teaches a nozzle that does not, and cannot create a rotational liquid material flow upon a substrate. The nozzle of Kobayashi can only create an inward radial flow. Rotational flow will only be accomplishable by rotating either the nozzle or the substrate as all art of record attests. As such, the rejection is disingenuous and should be withdrawn.

Claims 1-5 and 18 were rejected under 35 U.S.C. §102(b) as being anticipated by Mori (US 5,443,707). The Applicant respectfully traverses this rejection and requests the Office to consider the following.

The previous Office Action states that "the Applicant's arguments are not commensurate with the scope of the claims because they are broader than the scope of the claims. The Applicant respectfully disagrees and points to language in Amendment A. Regarding the 102(b) rejection set forth in the previous Office Action dated December 28, 1999, and the Applicant's response thereto, the Applicant respectfully asserts that the language used in Applicant's arguments are direct quotes of the claim language and therefore the arguments are commensurate with the scope of the claims.

The Applicant repeats the language used in those arguments:

The claims require "directing the liquid material angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface." (Claim 1).

(Amendment A at page 8). Further:

Because Mori does not 'teach every element of the claim' M.P.E.P. § 2131, particularly "directing the liquid material angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface" (Claim 1), and because "each and every element as set forth in the claims is [not] found, either expressly or inherently described" in Mori, Verdegaal Bros., withdrawal of the rejection is respectfully requested.

(Amendment A at page 9). Because the Applicant has used precisely the language of the claims as his arguments, the scope of the arguments is not broader than the scope of the claims. Withdrawal of this rejection is respectfully requested.

The previous Office Action next states that "Applicant has not shown how the method of Mori differs from the instantly claimed method." (previous Office Action, page 2). The Applicant respectfully disagrees with this statement and again quotes from Amendment A:

Mori fails to teach or suggest this limitation [of directing the liquid material angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface]. In fact, the flow within Mori's device is streamlined plug flow that cannot meet the limitations of the present invention. Mori is directed toward finding a size and shape of the anode 110 in order to achieve the flatter metal film 108. Streamlines depicted in Mori are incorrect and not attainable. The Applicant submits the reference of Transport Phenomena by Bird, Stewart, and Lightfoot, pages 219-220 as an illustration of streamlined flow in a conduit with an expansion. As illustrated in **Fig. 7.5-1**, flow just beyond a right-angle expansion redevelops to a parallel streamlined flow within the conduit. An angled expansion as depicted in Mori will only facilitate the redevelopment of parallel streamlined flow. Consequently and in contravention to the present invention, Mori's flow is plug flow style that is directed perpendicularly toward the substrate surface.

As stated above, and because Mori rotates the substrate, an action that is clearly stated as a problem in the prior art, the Applicant respectfully asserts that Applicant has shown how the method of Mori differs from what is claimed. Further, because Mori directs the liquid material perpendicularly toward the substrate surface, the Applicant respectfully asserts that Applicant has shown how the method of Mori differs from what is claimed. Withdrawal of the rejection is respectfully requested.

The previous Office Action next states among other things, that Mori "direct[s] the liquid material angularly toward the substrate surface (col.3, lines 41-46) so that the liquid material flows rotationally upon contact with the substrate surface (col.3, lines 46-50)." The Applicant respectfully disagrees. As stated above, Mori does not teach rotational flow rather, Mori teaches rotation of the substrate. This can be further elucidated by the Examiner's own arguments. The Examiner states that [i]t is the Examiner's position that 'directing the liquid angularly' as instantly claimed teaches the application of the liquid at any angle . . . [that] can also include perpendicular because 0° is an angle, and 0° from perpendicular is perpendicular." (previous Office Action, page 3). This statement fails to

take into account the plain meaning of the claim language. The claims require "directing the liquid material angularly toward the substrate surface *so that the liquid material flows rotationally upon contact with the substrate surface.*" (Emphasis added). Mori cannot achieve this because his perpendicular flow in the instant invention would result in radial flow across the wafer and not rotational flow upon contact with the substrate surface as taught and claimed in the instant invention. If the Examiner had not made an out-of-context quote from the specification, this argument would not have been advanced by the Examiner. To quote more completely from the specification with the Examiner's quotation, in context::

. . . which direct liquid 70 at an angle from perpendicular. *The resulting flow of liquid 70 on surface 40 is a rotational pattern.*

(Specification at page 5, lines 8-9. Emphasis added). Because the claim language, supported by the specification, excludes a perpendicular flow direction toward the substrate surface, withdrawal of this rejection is respectfully requested.

The previous Office Action next states that "Applicant has not claimed any criticality of rotational flow of the liquid" (previous Office Action, page 3). The Applicant respectfully traverses this statement and requests the Office to consider the following. What the Applicant claims is a method of applying a liquid material onto a surface of a substrate that is not taught by the prior art. It is the method of applying the liquid that is fundamentally different from Mori's method. Mori's method is perpendicular flow with rotation of the substrate. This creates problems as discussed in the specification of the instant invention. The present invention's method is "directing the liquid material

angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface." (Claim 1). The two methods are not the same. The instant invention overcomes the problems of the prior art. Withdrawal of the rejection is respectfully requested.

The previous Office Action next states something to the effect regarding "how the rotational flow of Mori (col.3, lines 46-50) differs from that as instantly claimed."

(previous Office Action, page 3). As far as Applicant understands what is being asserted, the Applicant traverses this statement and requests the Office to consider the following.

Mori does not teach or suggest rotational flow of the liquid. This should be abundantly clear by a plain reading of his specification. Mori teaches rotating the substrate. This rotation of the substrate is stated in the instant specification as a problem that was overcome by the instant invention. Withdrawal of the rejection is respectfully requested.

Rejection of claims 19 and 21-38 under 35 U.S.C. §102(b)

For all subsequent rejected claims, the Applicant will address each, but it is noted that the claimed limitation of a plurality of spray outlets, or the claimed flow regime that is accomplished thereby, is totally devoid of being taught in Mori. The previous Office Action states at page 5 that it is "the Examiner's position that nozzle is defined as a projecting vent of something (Merriam-Webster's Collegiate Dictionary, tenth edition). The Applicant believes that the Examiner is trying to assert that the flow lines illustrated in Mori are a plurality of vents. As discussed previously and as unrebutted by the Office, the flow lines in Mori are erroneously drawn. Further, the dictionary definition asserted by the Examiner precludes Mori from having more than one vent. The Applicant considers the

Office's plurality of vents assertion to be untenable. Mori teaches a single vent called INJECTION HOLE 102. For this reason alone, withdrawal of the rejections of claims 19 and 21-38 is respectfully requested.

Claims 19 and 21-26 were rejected under 35 U.S.C. §102(b) as being anticipated by Mori (US 5,443,707). The Applicant respectfully traverses this rejection and requests the Office to consider the following.

To anticipate a claim, the reference must teach every element of the claim. M.P.E.P. § 2131. It is well settled that "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil of California, 814 F.2d 628, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). (Cited at M.P.E.P. § 2131).

Claim 19 requires "spraying the liquid out of a plurality of outlets." Mori fails to teach or suggest a plurality of outlets. Because Mori fails to show each and every element as set forth in the claims, withdrawal of this rejection is respectfully requested.

The Office Action next states regarding claim 21, "Mori discloses spray outlets angled at approximately 20 to 60 degrees from vertical (see Fig. 6). The Applicant can see only one outlet, referred to as INJECTION HOLE 102 that is decidedly perpendicular to the substrate. Because Mori fails to show each and every element as set forth in the claims, withdrawal of this rejection is respectfully requested.

The Office Action next states regarding claims 22 and 23, "Mori discloses liquid directed radially outward with respect to the center of the substrate surface, and liquid directed circumferentially with respect to a perpendicular direction toward the substrate

surface (col.4, lines 20-34)." (Office Action at page 4). The Applicant respectfully traverses this rejection. Again, Mori teaches only one outlet that he calls an INJECTION HOLE 102 that is decidedly perpendicular to the substrate. This fails to teach or suggest the limitation of a plurality of spray outlets as set forth above. To further assist the Examiner, the Applicant directs the attention of the Office to the discussion of "directed radially" and "directed circumferentially" as set forth in the specification at page 5 line 15 to page 7, line 9. In any event, Mori fails to teach or suggest a plurality of spray outlets. Withdrawal of this rejection is respectfully requested.

The Office Action next refers to claims 24-26 and cites to Mori, col.5, lines 42-46. Referring to claim language of claim 24, the Office Action states "Mori discloses at least one of a plurality of spray outlets in a perpendicular direction toward the center of the substrate." This is incorrect. The lines drawn in Figure 7 of Mori refer to ELECTRIC FIELD 109 lines. Mori's ELECTRIC FIELD 109 lines cannot be remotely construed to be a plurality of spray outlets and withdrawal of the rejection is respectfully requested. The Office Action next refers to claim 25: " Mori discloses . . . the plurality of spray outlets includes at least four spray outlets forming a cross pattern." Again, the ELECTRIC FIELD 109 lines of Mori cannot be construed to be forming a cross pattern formed by a plurality of spray outlets. The previous Office Action next refers to claim 26: " Mori discloses . . . at least one spray outlet located at the center of the cross pattern." Again, the ELECTRIC FIELD 109 lines of Mori cannot be construed to be at least one spray outlet located at the center of the cross pattern. Withdrawal of the rejections is respectfully requested.

The previous Office Action next refers to claims 27-33 and rejects them for the same reasons as for claims 19 and 21-26. The Applicant regards the responses to the rejection of claims 19 and 21-26 to be appropriate and incorporates the substance of them herein by reference.

The previous Office Action next refers to claims 34-38 and rejects them for the same reasons as for claims 23-26. The Applicant regards the responses to the rejection of claims 19 and 21-26 to be appropriate and incorporates the substance of them herein by reference.

In summary, Mori fails to teach or suggest all the claims limitations and therefore does not anticipate the present invention as claimed. Withdrawal of the rejections is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 1, 27-33, and 34-38 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tomoeda et al. (US 5,629,913). The Office Action asserts that Tomoeda “direct[s] the liquid material angularly toward the substrate” (Office Action, page 7). The Office Action next admits that “Tomoeda et al. are silent regarding the liquid flowing rotationally upon contact with the substrate surface.” (Office Action at page 8). The Applicant respectfully traverses this rejection and requests the Office to consider the following.

The Applicant considers this a disingenuous rejection since the claim language requires

directing the liquid material angularly toward the substrate surface *so that* the liquid material flows rotationally upon contact with the substrate surface

(claim 1, emphasis added). It is only by rotation of Tomoeda's spin chuck 101, a technology that is identified in the instant invention as a problem in the prior art, that any rotational flow regime may be established as asserted by the Office Action. Withdrawal of the rejections is respectfully requested.

Claims 1, 3-5, 18, 19, 22-27, and 29-33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Arken et al. (US 6,001,235). The Applicant respectfully traverses this rejection and requests the Office to consider the following.

As set forth above, the claims are limited to "a technique for coating a substrate with a liquid material in such a way that the liquid material forms a coating with acceptable thickness uniformity across the substrate while avoiding the use of rotary or other mechanical motion to create a rotational liquid material flow. The claims address the scope of this limitation. Arken is just another reference that relies on rotary parts motion that is expressly disfavored by the present invention. Withdrawal of the rejection is respectfully requested.

Claim 2 was rejected under 35 U.S.C. §103(a) as being unpatentable over Arken et al. in view of Mori. The Applicant respectfully traverses this rejection and requests the Office to consider the following.

As set forth above, the claims are limited to "a technique for coating a substrate with a liquid material in such a way that the liquid material forms a coating with acceptable

thickness uniformity across the substrate while avoiding the use of rotary or other mechanical motion to create a rotational liquid material flow. The claims address the scope of this limitation. Arken and Mori are references that rely on rotary parts motion that is expressly disfavored by the present invention. Withdrawal of the rejection is respectfully requested.

Claims 21-38 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kobayashi. The Applicant respectfully traverses this rejection and requests the Office to consider the following.

Because Kobayashi fails to teach anything but inward radial flow, the Office Action's various characterizations of how Kobayashi may meet the limitations of claims 21-38 is disingenuous and should be withdrawn. Withdrawal of the rejections is respectfully requested.

The Applicants consider the present application now in condition for allowance and respectfully request that the application be passed to allowance. In the event that the Examiner finds any remaining impediment to a prompt allowance of this application that could be clarified by a telephonic interview, the Examiner is respectfully requested to initiate the same with the undersigned attorney.

DATED this 14th day of February 2001.

Respectfully submitted,



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